SECTION 5.00
PIPE TRENCHES

5.01 EXCAVATION AND PREPARATION OF PIPE TRECNCHES

Trenches for water distribution lines, sanitary sewer lines, force mains, and storm sewer lines shall be excavated to the required depth to permit the installation of the pipe along the lines and grades shown on the construction drawings**. Water mains shall be buried to a depth below the frostline or 36-inches from the top of the pipe, whichever is greater.** The minimum trench width at the top of the pipe shall be at least 18 inches greater than the outside diameter of the pipe. Where excavation is in rock, the rock shall be removed to a depth of at least 6 inches below grade and shall be backfilled with materials in accordance with these specifications. Wet trenches shall be stabilized with #78 M stone or with a base layer of #57 stone.

5.02 PIPE LAYING AND BACKFILLING

All pipe shall be laid in accordance with the manufacturer's recommendations. **Pipe laying and backfilling shall be accomplished in a manner to prevent damage and mis-alignment of the pipe.** The subgrade at the bottom of the trench shall be shaped to secure uniform support throughout the length of the pipe. A space shall be excavated under the bell of each pipe to provide space to relieve bearing pressure on the bell and to provide room to adequately make the joint. Open ends of the pipe shall be plugged with a standard plug or cap at all times when pipe laying is not in progress. Trench water shall not enter the pipe. Backfill material shall be free from construction materials, debris, frozen material, organic material, or unstable material. The top 2 feet of backfill material shall be free from stones greater than **2** inches in diameter.

Under roadways and extending at a slope of 1 to 1 beyond the back of the curb, measured perpendicular from the centerline, backfill shall be compacted to a density of no less than **100%** standard Proctor maximum dry density as measured by AASHTO method T99. Backfill shall be placed in lifts of 8 inches or less of the uncompacted soil. Other fill material shall be compacted to a density of no less than **95%** of the maximum dry density as measured by AASHTO method T99. Backfill material shall be placed in lifts of 6 inches or less of the uncompacted soil. Suitable backfill material shall be utilized and compacted in accordance with the City compaction requirements and the pavement repair shall be in accordance with Standard Detail 5.01.

All trenches shall be properly backfilled at the end of each working day. All curb cuts shall be repaired within a maximum of three (3) days from the date the cut is made. If conditions do not permit a permanent repair within the given time limit, permission to make a temporary repair must be obtained from the City Engineer.

In locations where backfill material is temporarily stockpiled on the roadway surface, a layer of 1½ inches of screenings shall be used between the pavement surface and the backfill material.

5.03 BORING AND JACKING

In locations where open pipe trenches are not allowed, dry bore and jack operations may be allowed. **Boring and jacking shall be accomplished in a manner to prevent damage or mis-alignment of the pipe.** Smooth wall or spiral welded steel pipe may be jacked through dry bores slightly larger than the pipe bored progressively ahead of the leading edge of the advancing pipe. The spoil material shall be mucked by the auger back through the pipe during the boring operation. As dry boring progresses, each new section of the encasement pipe shall be butt-welded to the section previously jacked into place.

The steel pipe shall be manufactured of grade 'B' steel with a minimum yield strength of 35,000 psi in accordance with ASTM A139 and A283. When used along or under a roadway maintained by NCDOT, the encasement pipe shall be coated to meet NCDOT requirements.

If voids are encountered while installing encasement pipe thirty (30) inches or larger, grout holes shall be installed at ten (10) foot centers and filled with 1:3 Portland cement grout at sufficient pressure to prevent settlement of the roadway, unless NCDOT approval stipulates otherwise. Other grout mixtures may be submitted for approval.

In the event that an obstruction is encountered during the boring and jacking operation, the auger is to be withdrawn and the excess pipe is to be cut off, capped, and filled with 1:3 Portland cement grout at a sufficient pressure to fill all voids before moving to another site.

Size and wall thickness of smooth wall or spiral welded encasement pipe shall be as follows:

Pipe Size (O.D.)	Wall Thickness (in.)
12 ¾"	0.188
14"	**0.250**
16"	0.250

18”	0.250
20”	0.250
24”	0.250
30”	0.312
36”	0.375

Casing pipe shall be installed with a minimum cover of 3 feet under pavement.

All carrier pipe shall be slip joint ductile iron pipe resting on steel skids as shown on **Standard Detail 5.06** so as to prevent damage to the pipe bell. A minimum of two (2) skids per joint of carrier pipe spaced evenly in the encasement pipe shall be required. Pipe bells shall not contact the interior of the casing pipe. No blocks or spacers shall be wedged between the pipe and the top of the casing. Casing pipe shall have the following minimum sizes:

Carrier Pipe Size (in)	Casing Pipe Size (in)
4	12 ¾
6	12 ¾ or **14**
8	18
10	20
12	24
14	26
16	28

In cases where circumstances such as utility conflicts will not allow crossing by bore and jack method, the City may consider approving other methods of crossing with additional requirements to minimize pavement failure and maintenance problems.

END OF SECTION 5.00